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THAILAND NATIONAL PROGRAMME

OF THE

FARTH RESOURCES TECHNOLOGY SATELLITE

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Bangkok 9, Thailand

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First Type I Progress Report to NASA

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First Type I Progress Report to NASA

1. Title of Investigation: The Thailand National Program of the Earth Resources Technology Satellite (ERTS-B)

2. Proposal Number: G28080

3. Principal Investigator: Dr. Sanga Sabhasri, Secretary-General, National Research Council of Thailand

4. Reporting Date: October 15th, 1975.

5. Objective: The overall objective of the Thailand National Program is to produce, based on satellite data, an up-to-date and accurate information required for planning for development and management of natural resources at the national level. The LANDSAT-2 program is an ERTS-1 follow-on program with refinements and revised objectives derived from experience with ERTS-1 data.

6. Summary of Accomplishments:

   (1) As part of a project agreement between the Government of Thailand and the U.S. Operations Mission to Thailand (USOM), eight Thai scientists from various government agencies received training in remote sensing at various centers of expertise in the U.S., during the period September 1974 to September 1975, in the field of agriculture, forestry, geology, hydrology, cartography, sensors and automatic data processing. These scientists will further strengthen the team of technical personnel presently engaged in remote sensing applications under the national program.

   (2) In November 1974, The National Research Council sought approval from the Civil Service Commission for ten permanent positions in the Thailand National Remote Sensing Coordinating Center. The application was subsequently approved in May 1975 and the new manpower scheme went into effect October 1, 1975. These are all full time positions including one Director, one Assistant-Director, four scientists, one administrative assistant, one secretary and two photo-technicians. In addition to the above permanent staff, five more technical personnel are hired on a yearly basis. The actual manpower of the Center is more than the above since several of the existing staff are loaned from the Applied Scientific Research Corporation of Thailand and other related agencies.

   (3) The National Research Council in October 1974, submitted a request to the National Economic and Social Development Board (NESDB) for conducting a feasibility study of an Earth Resources Technology Satellite Data Receiving and Data Processing and Analysis Facility

in Thailand. NESDB agreed on principle for such study and requested The United Nations Development Program (UNDP) for assistance. The terms of reference call for four expert advisors, each for 2-3 months, to make a study on LANDSAT receiving station, satellite data reproduction, remote sensing computer software and economic evaluation under the objectives of: (1) determining the probable economic and social benefits to Thailand and to countries within the geographical region served by the station in 5 to 10 years time frame; and (2) determining parameters and alternatives for implementation, such as, location, equipment, timing, operating staff, initial costs, and annual operating costs, etc. UNDP is favorable to such study but considers such undertaking to be more of a regional or global nature and has provided financial assistance to the Economic and Social Commission for Asia and the Pacific (ESCAP) to conduct such study which will begin in a few months.

(4) A new two story building, to be located in the present NRC/ASRCT compound on Pahonyothin Road, has been authorized by the RTG. The ground floor will house the working facilities and offices of the Thailand National Remote Sensing Program, and will be the future national center of activity for data reproduction, dissemination, and analysis. The NRC/ASRCT Remote Sensing Working Unit designed the ground floor facilities, totalling about 900 m^2, with assistance from the Technical Advisor. Offices, data handling room, interpretation, instrumentation, copy camera, document printing, final inspection, and storage spaces are grouped around a central core divided into rooms for photographic film and paper processing and reproduction. Construction of the building, estimated to cost Baht 6,000,000, is expected to start in December, 1975.

(5) The Asian Institute of Technology recently proposed a study of automatic data processing techniques based on adaptation of existing software to a tropical frame of reference, with emphasis on identification and mensuration of major agricultural crops. The project has been funded by the Regional Economic Development sector of AID through the Mekong Secretariat in Bangkok. Processing routines will be developed starting with LARS and CSU software, and using the present CDC 3600 computer at AIT and later an IBM 370/145 machine to be installed early in 1976. Intensive ground observations and low altitude aerial photographs conincident with LANDSAT-2 overpasses are currently being made to accumulate data for development of training sets.

(6) The Agricultural Economics Division, Ministry of Agriculture, has been awarded a grant form the Environmental Research Institute of Michigan, under a program funded by the AID Office of Science and Technology. The primary objective of the grant is to

develop superior agricultural crop distribution and production statistics using automatic data processing techniques developed by experiment and verified by an extensive statistical program, called area frame sampling, currently under development by Iowa State University on a USOM contract. This project compliments the AIT computer processing project, and the two agencies are expected to cooperate closely.

(7) A color satellite photomap depicting the January 1973 scene of Central Plain of Thailand at a scale of 1:500,000 with general description of sensors and interpretation was reproduced by offset printing on art paper. The original color print is made available by courtesy of TRW, Corp. A large quantity of the photomap was printed for distribution to government agencies, universities and schools, etc.

7. Problems Encountered

A four-band aerial camera acquired in 1974 for support of image interpretation projects under the Thailand National Remote Sensing Program was found to be deficient in several respects and was returned, after ground and flight tests, to the manufacturer. Problems encountered have not been resolved, and planning has been revised to insure that aerial photographs will be provided by the Royal Thai Survey Department (RTSD) and the Royal Thai Air Force (RTAF). The RTAF is presently acquiring one or more four-band cameras from the U.S., and RTSD can supply panchromatic and black and white infrared photographs of excellent quality. During September 1975 the RTSD obtained large scale aerial photos of test areas designated for the AIT project.

8. Significant Results Obtained

(1) Following a two year struggle to obtain adequate and reasonably low-cost equipment from U.S. commercial sources through USOM and USGS channels, a precision photo reproduction facility has been partially implemented in Thailand. With generous technical assistance from the USGS EROS Data Center in Sioux Falls, South Dakota, precision black and white photo reproduction from 70 mm negatives can now be done at scales of 1:1,000,000 and 1:500,000, and facilities recently completed will allow production also of 1:250,000 scale prints. Monochrome prints in these three scales and diazochrome color transparencies at 1:1,000,000 scale are at present the most widely used data products for research in Thailand.

(2) Forest inventory of the whole country was completed in January, 1975 using LANDSAT-1 imagery and ground truth survey. The result of the study which was conducted by the Royal Forestry Department,

showed the existing forested area to cover only 37% of the land area. The last country-wide survey using aerial photographs at 1:60,000 scale conducted in 1961 gave the figure of 58%. Refinement of the areas under cloud cover during ERTS-1 coverage is being made using LANDSAT-2 imagery. Attempt to differentiate some different forest types using B & W and diazochrome transparencies has been partially successful.

(3) Photo-interpretation of ERTS-1 imagery together with ground truth checks have been completed for the mangrove study. The result showed that Thailand's mangrove forest covers an area of approximately 3130 square kilometers. The last aerial survey conducted in 1965 gave the figure of 3681 square kilometers. A paper is being prepared for presentation at the Workshop on Mangrove Ecology to be held at Phuket Marine Biological Center, South Thailand, in December 1975, co-sponsored by UNESCO and NRC.

(4) Study of sedimentation as revealed by ERTS-1 imagery leads to the possible interpretation of the distribution of littoral mudflats along the coast of Thailand. Knowledge of the extent of mudflat is useful for shrimp and oyster farming which is fast becoming an important economic factor. A paper is also being prepared for presentation at the Workshop on Mangrove Ecology.

9. Operating Procedures, Publications, Recommendations

(1) List of publications

- The Earth Resources Technology Satellite Program in Thailand, by Joseph O. Morgan, USGS Remote Sensing Advisor from USOM to the National Research Council, Thai American Business Magazine, Sep-Oct 1974, pp 15-19

- Technical Note No. 750328, Satellite Data Receiving Station, Area Coverage and Data Acquisition Parameters for a Station Located Near Bangkok, Thailand National ERTS Programme, March 1975, 12 pages.

- Instrument Note No. 74-1, Cleaning and Mechanical Adjustment Four Channel Viewer/Projector Spectral Data Corp. Model 64, First Draft, August 1974

- ERTS Print 740920, Thailand Experimental Satellite Photomap

- ERTS Print 750428, Thailand National LANDSAT Programme, Condensed Summary of the Thailand National Remote Sensing Project, 1974-1975

- Surveying of Forestry Resources Using Imagery from Satellite, by Dr. Chumni Boonyopas and Boonchana Klankamsorn, Royal Forestry Department, Dec. 1974, 40 pages

- Earth Resources Technology Satellite (ERTS-1) for Agricultural Applications, Pongpit Piyapongse, Report to Agricultural Technical Department, 1974

- Thailand Benefits from Earth Resources Technology Satellite, by Suvit Vibulsresth, Assistant Coordinator, Thailand National ERTS Program, US Information Service Magazine, 74-148(10)

- Benefits Thailand Received through ERTS Data, by Dr. Sanga Sabhasri, Secretary-General National Research Council, presented at Seminar on "ERTS and S.E. Asia", May 1974

(2) Recommendations

The data products hitherto provided are of excellent quality. However, the restriction of data cost limits the scope and timeliness of investigation to some extent. It is thus recommended that data cost should be further increased from the present ceiling of $2,300.00.

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